Amendments to the Specification:

Amend the paragraph at page 1, lines 11-23, as follows:

Nitrogen doping, particularly Remote Plasma Nitridation (RPN), is a known technique for increasing the dielectric constant (and hence the unit capacitance) of silicon oxide dielectrics. An increased dielectric constant, ε, helps in reducing the amount of leakage current experienced as compared to an undoped silicon dioxide layer having the same capacitance. However, there are several associated drawbacks with conventional methods of plasma nitridation used in conjunction with gate thicknesses around 15 Å or less. First, a relatively strong dosage ~~concentration~~ of nitrogen ($2.0 \times 10^{15}/cm^2$ or greater) introduced into an oxide layer by RPN causes additional growth of the layer. This may result in unacceptable gate dielectric thicknesses where it desired to maintain the physical thickness around 15-20 Å. In addition, the direct nitridation of a silicon oxide layer typically results in a non-uniform distribution of nitrogen atoms therewithin. As a result, the uneven growth of film at the interface during nitridation affects the overall uniformity of the film thickness.

B1

Amend the paragraph at page 1, line 24 to page 2, line 4 as follows:

Although additional unwanted growth of the gate dielectric may be curtailed by decreasing the dosage ~~concentration~~ of the nitrogen atoms introduced during the plasma nitridation process, this comes at the expense of a lower dielectric constant and, thus, a higher leakage current per unit capacitance. A need, therefore, exists for an improved process for plasma nitridation which results in a higher nitrogen dosage ~~concentration~~ in the dielectric, but does not substantially increase the dielectric thickness or sacrifice the uniformity of film thickness.

Amend the paragraph at page 2, lines 6-14 as follows:

B2

The above discussed and other drawbacks and deficiencies of the prior art are overcome or alleviated by a method for forming a gate dielectric for an integrated circuit device. In an exemplary embodiment of the invention, the method includes forming an initial oxynitride layer upon a substrate material, the oxynitride layer having an initial physical thickness. The initial oxynitride layer is then subjected to a plasma nitridation, the plasma nitridation resulting in final oxynitride layer having a final thickness. In one embodiment, the final physical thickness exceeds the initial physical thickness by less than 5 angstroms and is less than 20 angstroms. Finally, the final oxynitride layer has a nitrogen dosage ~~concentration~~ of at least 2.0×10^{15} atoms/cm^2.

Amend the paragraph at page 4, lines 3-12 as follows:

B3

While the oxynitride layer 16 has a higher dielectric constant than the oxide layer 12 (i.e., $\varepsilon_{SiO_2} \approx 3.9$, whereas $\varepsilon_{SiO_xN_y} \approx 6.0$), the RPN process results in an increased physical, or measured thickness of the gate dielectric. For example, if the original oxide layer 12 shown in Figures 1(a) and 1(b) has an initial film physical thickness "w" of approximately 15 Å, the RPN process 14 applied thereto causes additional layer growth such that the change in gate film physical thickness "Δw" may be as much as 10-15 Å. Again, an unwanted increase in gate film physical thickness may be addressed by decreasing the dosage ~~concentration~~ of the nitrogen atoms used in the RPN process. However, this comes at the expense of a lower dielectric constant, $\varepsilon_{SiO_xN_y}$, and thus poorer performance.

Amend the paragraph at page 4, lines 13-20 as follows:

B4

Referring now to Figures 2(a) through 2(e), a method of forming a gate dielectric, in accordance with an embodiment of the invention, is shown. Prior to oxidation, a silicon substrate 20 is first ionically implanted with nitrogen atoms, represented by lines 22 in Figure 2(a). At an implantation nergy of 11KeV, the ionic

B4

implantation results in the substrate 20 having a dosage ~~concentration~~ of nitrogen atoms N in the range of about 6.0×10^{14} to 1.0×10^{15} atoms/cm^2, shown in Figure 2(b). Next, Figure 2(c) illustrates the implanted substrate 20 after thermal oxidization, thereby forming an initial oxynitride layer 24 having an initial physical thickness "w".

Amend the paragraph at page 4, line 21 to page 5, line 3 as follows:

B5

Once the initial oxynitride layer 24 is formed, the nitrogen dosage ~~concentration~~ therein is thereafter increased by subjecting the initial oxynitride layer 24 to a plasma nitridation process, illustrated by lines 26 in Figure 2(d). Plasma nitridation, including remote plasma nitridation (RPN), is a process wherein the reactive nitrogen species is excited such as by microwave excitation. The excited plasma is introduced into a plasma chamber (not shown) where the substrate and oxynitride layer 24 are exposed thereto. In remote plasma processing, the substrate is located outside the plasma generation region. Although RPN is the preferred method of nitridation in the present embodiments, it will be appreciated by those skilled in the art that conventional, or direct plasma processing may also be implemented.

Amend the paragraph at page 5, lines 4-16 as follows:

B6

As a result of the RPN of the initial oxynitride layer 24, a final oxynitride layer 30 is formed, which preferably has an increased nitrogen concentration of at least 2.0×10^{15}/cm^2. Further, the final oxynitride layer 30 has a final physical thickness "w + Δw" (Figure 2(e)), where Δw is approximately 2-5 Å. Thus, an ultra thin gate dielectric having an increased nitrogen dosage ~~concentration~~ may be formed without a significant corresponding increase in the overall film physical thickness. Any additional growth of the initial oxynitride layer 24 depends upon the ability of the deposited or implanted material to penetrate the existing layer and reach the interface. Because a SiO_xN_y layer has a higher density than that of a SiO_2 layer, it is relatively more difficult for the excited nitrogen species in plasma to penetrate all the way through to th interface and

B6

to generate growth of the layer. Therefore, a nitridation of an oxynitride layer will result in less additional growth of the layer than would be the case of an oxide layer.

Amend the paragraph at page 8, lines 7-20 as follows:

B7

Finally, Figure 8 illustrates a comparison of the effective electron mobility in the silicon substrate inversion layer for differently fabricated dielectrics. Electron mobility relates to the speed of the device (i.e., how fast the carriers move). At low longitudinal fields (small electric fields in the plane of the substrate/insulator interface), the velocity of the electrons is proportional to the magnitude of the field itself. The proportionality constant is called the effective mobility, μ_{eff}. Generally speaking, a plasma nitridation process used to form silicon oxynitride with a high nitrogen dosage ~~concentration~~ can result in a significant decrease in the electron mobility in a gate dielectric. In gates conventionally formed with a silicon oxynitride layer having a high nitrogen dosage ~~concentration~~ (i.e., RPN of an oxide layer), the effective mobility may be reduced by as much as 50-70%. However, in gate dielectrics nitrided in accordance with the disclosed embodiments, the effective mobility reduction is much less severe while still maintaining a thin oxynitride film containing a high nitrogen dosage ~~concentration~~.